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### ORTHODONTICS



### ORAL SURGERY



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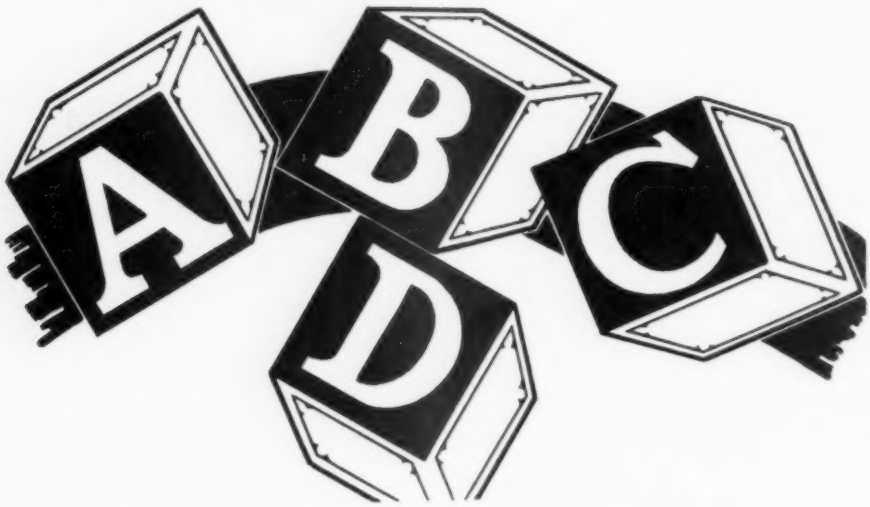


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SEPTEMBER, 1943

# Oral Surgery

including

## Oral Medicine, Pathology, Diagnosis, and Anesthesia



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# Original Articles

## Y-SHAPED OSTEOTOMY FOR CORRECTION OF OPEN BITE IN ADULTS

KURT H. THOMA, D.M.D., BOSTON, MASS.

OPEN bite, or apertognathia, is a condition in which there is a space between the upper and lower jaw; that is, between the maxillary and mandibular anterior teeth when the posterior teeth are in contact. Those having this deformity, which first of all tends to impair their appearance, are unable to incise; that is, to bite off food such as a piece of apple. They may have difficulty with mastication in general, and often have speech defects. Some are mouth breathers, not being able to keep their lips occluded, and are liable, therefore, to suffer from chronic pharyngitis, tonsillitis, and adenoids. The deformity may be due either to malformation or to improper reduction and immobilization of a fracture of the maxilla or mandible.

### MALFORMATION

In many cases open bite is believed to be due to thumb and finger sucking and abnormal tongue habits. There is considerable clinical evidence, however, that open bite in many cases is due to inhibited development of the premaxillary area, which is derived from the frontonasal process in the embryo (Fig. 1). This underdevelopment may be due to diseases affecting the normal development of the skeleton and causes arrested vertical growth of the alveolar process and teeth in this region. It is often associated with hypoplastic defects in the enamel and has been observed in rickets (Fig. 2). In another case of rickets open bite was found to be due to a downward bending of the lower jaw caused by the pull of the depressor muscles.

In determining the etiological factors in these cases, it should be remembered that tongue habits may have developed because of the malformation rather than caused by it, although it must be admitted that they probably act as a contributory cause in most cases. In these malformations the open bite always causes an angulation in the occlusal curve in either the upper or lower jaw, or both. A distinct downward bend in the anterior part of the mandible is known as *ectopia* of the jaw.

Another type of open bite is said to be caused by arrested vertical development of the ramus. This malformation is characterized by the fact that only the last molars on each side are in occlusion and the rest of the bite is open, the space between the teeth increasing gradually without there being any angulation. A case of this type of malformation is shown in Fig. 3.

According to an analysis of 115 children with open bite made by Swinehart, 73 involved the incisors only, 25 the incisors and canines, 11 the incisors, canines,

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From the Department of Oral and Plastic Surgery, Harvard School of Dental Medicine.

and one or both premolars, and in 1 case the malformation included the first molar. The remaining 5 cases did not include the anterior region.

### MALUNITED FRACTURES

Open bite may be the result of faulty reduction or poor immobilization with ineffective control of muscle pull. It occurs in three types of fractures, as follows:

Fig. 1. Fig. 2. Fig. 3.

Fig. 1.—Underdevelopment of the premaxilla causing open bite.

Fig. 2.—Child, 11 years old with a history of rickets, presents underdevelopment of the premaxilla and hypoplastic defects in the incisor teeth.

Fig. 3.—Open bite due to arrested vertical development of the ramus; only the third molars occlude in this case.

1. In complete horizontal fracture of the maxilla, when the pull of the pterygoid muscles causes a backward and downward displacement of the posterior part of the upper jaw, opening the incisor bite (Fig. 4). This deformity can best be remedied by refracturing the maxilla by horizontal submucosal division of the five vertical walls, the outer surface on both sides, and the nasoantral walls of the upper jaw, and the nasal septum.

2. In fractures of the horizontal ramus, if the downward pull of the anterior part of the mandible by the depressor muscles of the jaw is not effectively prevented by proper fixation on the anterior part of the dental arch (Fig. 7).

3. In bilateral fracture of the neck of the condyle. These cases are very frequent. In most of them the elevator muscles of the jaw cause overriding (Fig. 5). As a result, the ramus is shortened, and with the posterior molars acting as a fulcrum the upper and lower incisors are drawn apart (Fig. 6). In immobilizing such a fracture it is extremely important to prevent gradual opening of the bite through the action of the elevator muscles, the effect of which is increased if trismus sets in. The bite tends to open up when the intermaxillary ligation in the anterior region is not strong enough to overcome the tension of the muscle pull.

Fig. 4.

Fig. 5.

Fig. 4.—Open bite resulting from improper reduction of horizontal fracture of mandible.
Fig. 5.—Bilateral fracture posterior to the second molar with malunion causing open bite.

Fig. 6.

Fig. 7.

Figs. 6 and 7.—Patient sustained a triple fracture of the mandible at the symphysis and neck of the condyle on each side. The x-ray examination disclosed overriding (Fig. 6) which caused open bite (Fig. 7).

It is clear that in malunited fractures there are again two types of open bite. In one there is a gradual opening of the entire occlusal plane, due either to displacement of the maxilla or to shortening of the ramus. In the other there is an angulation of the horizontal part of the mandible, either within or directly behind the dental arch. The two types, no matter whether they are caused by maldevelopment or by fracture, should be differentiated, since they require different kinds of treatment.

### ORTHODONTIC TREATMENT

In children up to 12 or 14 years of age, malformations can be corrected by orthodontic procedures which tend to activate the underdeveloped section of the jaw, and by eliminating tongue habits which they interfere with the treatment. The older the patient, the less favorable is the outlook for obtaining a satisfactory result.

### SURGICAL TREATMENT

In adults, excellent results can be obtained by surgical procedures. Operation, however, is indicated only in severe cases in order to correct definite disabilities, which include psychoses, the basis of which is the unattractive appearance caused by the deformity.

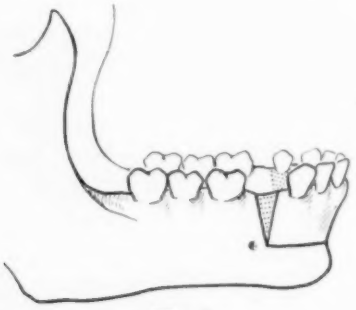

Fig. 8.

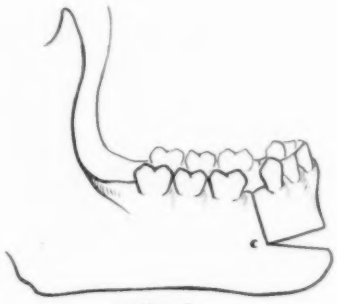

Fig. 9.

Figs. 8 and 9.—Correction of open bite according to Hullihen. V-shaped section two-thirds through mandible.

The first operation devised to improve a malformation of the jaw by surgical means was reported by Hullihen in 1849. The patient, a girl 20 years old, had a deformity due to traction caused by a scar from a burn on the neck, received fifteen years previously. The mandible was bent down and the bite was open. The operation, performed without anesthesia and at a time when hemostatic forceps and antiseptics were unknown, consisted of the resection of a V-shaped section from each side of the mandible, including on one side a premolar tooth. This section extended only two-thirds of the way through the bone, at which point the saw was turned horizontally forward. Removal of the sections of bone permitted the loosened anterior portion of jaw to be pushed back and up (Figs. 8 and 9).

Although this operation was successful, almost fifty years elapsed before a similar one was performed by Blair (1897). This and another operation were reviewed by Angle[1,2] in 1898. One operation was performed at the Baptist Hospital in St. Louis, with excellent results; the other was performed at a hospital in New Orleans, and nearly cost the patient his life, with total loss of the mandible through necrosis. Failure was due to the fact that practically no support was given the segments of bone, Barton bandage and wiring of bone being depended upon for stabilization. (A crude wire ligature was placed on each side, but one dropped out three days after the operation.) Angle emphasized the importance of proper stabilization of the fragments after operation, and of removing a complete V-shaped or wedge-shaped section of bone.

Since that time only occasional reports on the surgical treatment of malformed jaws have appeared in the literature. Most of these articles deal with the lengthening or shortening of the jaws to correct either macrognathia or micrognathia—that is, protrusion or retrusion of the mandible—although open bite is occasionally included because it is likely to be combined with mandibular protrusion. In 1901 von Eiselsberg performed an operation similar to that of Hullihen on an ectopic mandible, the cause of which was a dermoid cyst. Lane, in 1905, and Pickerill, in 1912, who mentions the former, both performed wedge-shaped excisions in the premolar region extending through the whole thickness of the mandible. Mayrhofer, in 1916, also recommended the resection of a wedge-shaped section to transpose the anterior part of the jaw, but believed that the first molars should be extracted previously. Korth, in 1921, favored an operation in the horizontal ramus because it is the part of the bone involved in the anomaly. Blair, in his book, *Surgery and Diseases of the Jaws* (1927), recommended for certain cases a simple bilateral section of the horizontal ramus. This allows one to move the detached part of the jaw up into occlusion. The operation, however, is applicable only to cases in which the jaw does not need to be tilted, or set back. Many cases of open bite, however, are associated with some mandibular protrusion, even if not marked, and if the anterior segment in such cases is not tilted back, the lower incisors will protrude over the upper ones when brought into position. The illustration of Blair, of which Fig 10 is a copy, is a good example of the fact that simple osteotomy does not correct open bite satisfactorily. Blair himself stated that if the jaw needs to be tilted, as it does in most cases, it is necessary to remove a V-shaped section. If the jaw were tilted back after a simple osteotomy without a V-shaped resection a reversed V would open at the lower border of the mandible, as shown in the case described by Bruhn, in 1927, and illustrated in Fig. 12. The resulting inadequate apposition of the fragments would prevent healing in many cases. The resection of a V-shaped piece of bone, as shown in Fig. 13, has therefore been recommended by all who describe operations in the horizontal ramus. Blair recommends in addition an S-shaped cut, which, he states, has the advantage of not shortening the jaw. Kazanjian, in 1932, attempted a semicircular incision on one side with a special trephine; on the other side a surgical bur was used. The cutting with the trephine, he stated, was disappointing, but the bur worked very satisfactorily.

An entirely different approach has been suggested by Babcock, 1909. He described the case of a boy of 18 on whom he performed a bilateral transverse section of the ramus (Fig. 11, line *1*). He chose this operation to avoid reduction of the size of the dental arch and injury of the inferior alveolar nerve and vessels. He states, however, that the operation in the ramus is indicated only in cases in which careful study shows that a fair occlusion can be attained without changing the angulation of the dental arch.

Limberg, 1926, a Russian surgeon, also advised that an operation be performed in the ramus, but again only for cases in which open bite is caused by deficiency in that part. His operation to elongate the ramus consists of an oblique osteotomy performed from an incision below the angle of the jaw. The

bone is cut beginning at the mandibular notch, with a backward and downward sloping to the posterior margin of the ramus (Fig. 11, line *2*). Limberg pointed out that obstacles to success with this method are the stylomandibular ligament and the elevator muscles attached to the posterior part of the jaw,

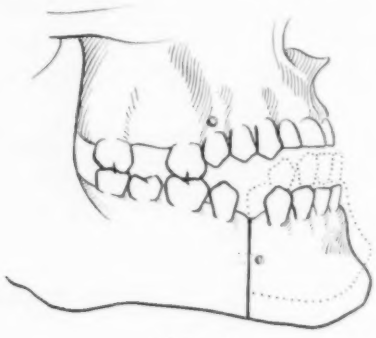

Fig. 10.

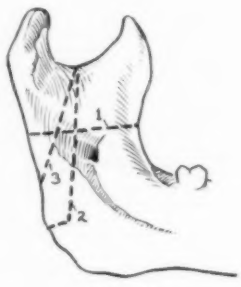


Fig. 11.

Fig. 10.—Correction of open bite. Simple osteotomy according to Blair and vertical displacement of anterior fragment.

Fig. 11.—Three methods for correction of open bite in the ramus. *1*, horizontal osteotomy first described by Babcock; *2*, oblique osteotomy in ramus after Limberg; *3*, oblique osteotomy at neck of the condyle according to Kostečka.

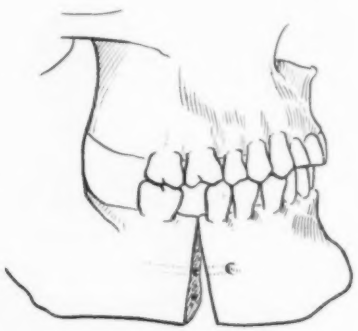

Fig. 12.

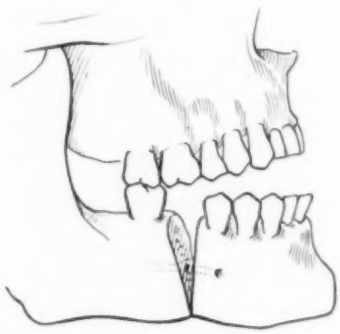

Fig. 13.

Fig. 12.—Simple bilateral osteotomy causes V-shaped space to open when the anterior fragment is placed in position.

Fig. 13.—Correction of open bite by a V-shaped excision of bone.

which may prevent the bringing down of the mandible. The muscles may gradually cause retraction after the operation, for which reason he recommended overcorrection. Kostečka, 1934, like Babock, favored an operation beyond the dental arch. He recommended a section at the neck of the condyle (Fig. 11, line *3*). This operation as well as Babcock's can be performed with a Gigli saw and has the advantage of an easy technique. None of the operations performed in the ramus, however, allows a change in the angulation of the mandible. They are indicated therefore, only for cases in which the deformity is due to underdevelopment or shortening of the ramus, and not for the commoner type of open bite in which angulation in the dental arch has to be overcome.

*Planning of Treatment.*—The treatment should be carefully planned after a thorough study has been made of the deformity. Open bite due to underdevelopment or shortening of the ramus should be carefully distinguished from that due to angulation within the dental arch. The first type of deformity

calls for correction in the ramus, the second for an osteotomy just anterior to the last tooth in occlusion. As the simple osteotomy is inadequate in most cases, excision of a section of bone is indicated to allow tilting up of the anterior part of the jaw. The V-shaped excision, which is generally performed from an intraoral approach, has two decided disadvantages. First, it involves the mandibular nerve and artery, which are generally severed; second, it causes considerable retrusion and slanting of the lower incisor teeth, owing to the amount of tilting necessary to correct excessive open bite when associated with only moderate or no mandibular protrusion. The latter disadvantage may be overcome by a modification of the conventional procedure consisting of a combination of the V-shaped excision and straight osteotomy, a method that may be designated as the Y-shaped excision.

### Y-SHAPED EXCISION IN HORIZONTAL RAMUS

The Y-shaped excision has the advantage of facilitating the preservation of the mandibular nerve and artery and of causing only a small amount of retrusion of the jaw. While the numbness from cutting the mandibular nerve which generally follows complete sectioning of the jaw from an intraoral or extraoral approach is not usually permanent, it causes embarrassment to the patient because of the dribbling of saliva and dropping of food associated with it. Avoidance of this complication is therefore highly desirable.

This operation is especially indicated in cases of open bite with little or no mandibular protrusion, but it can be adapted to cases in which protrusion is marked. In such cases a rhomboid section is removed in two parts, in a similar manner as New and Erich, 1941, excised a parallel section for correction of prognathism. The first part of the rhomboid piece, wider on the top than on the bottom, is removed by an intraoral approach above the mandibular canal; the second and narrower part below the mandibular canal is excised by an extraoral approach. The operation serves to shorten the jaw and at the same time to tilt it up without injury to the nerve and vessels.

*Technique.*—The Y-shaped excision consists of an intraoral and an extraoral operation, performed on both sides of the jaw. After the former is finished the latter follows with a complete new sterile set-up. This procedure may take a little longer than the V-shaped excision, which can be done intraorally, but it repays extra time by giving a much better result.

The intraoral stage consists of cutting out a short V-shaped piece, the apex of which extends to the mandibular canal. The lower part of the mandible is cut in a vertical direction from the inferior border up to the mandibular canal, leaving a thin strand of bone which contains the nerve and artery (Figs. 14 and 15). This bridge can be fractured by forcing the anterior part of the mandible into the correct position, as will be described. On positioning of the mandible, the V-shaped space in the alveolar process closes and a reversed V-shaped space opens at the lower border of the jaw.

The operation is performed at the place where the mandible is angulated, or where the open bite begins. Unless there is an edentulous space on one or both sides, a tooth must be extracted. This can be done 2 or 3 weeks before

the operation, or at the time the osteotomy is performed. An arch-wire splint, however, must be constructed and cemented into place beforehand.

ILLUSTRATIVE CASE

The case used to illustrate this procedure is that of a patient 18 years of age, who when young had a habit of thrusting his tongue between his teeth. He was in perfect health but had been rejected by the Air Corps because of an open bite extending from the first molars forward, as shown in Figs. 16, 17, and 18. He came to me with the request to have this deformity corrected surgically. X-ray photographs were taken of both sides (Figs. 19 and 20). I decided to remove the first molar on each side in order to create the necessary space to perform the Y-shaped excision just described. One of the molars was affected by deep secondary caries, and there appeared to be a good chance that the third molars, when erupting, would push the second molars forward and partly close the space.

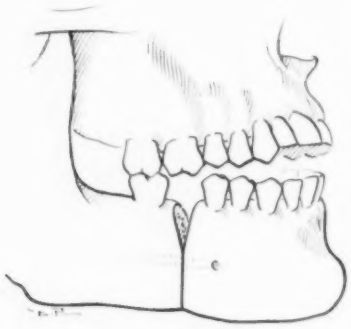

Fig. 14.

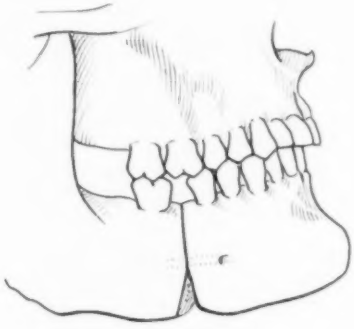

Fig. 15.

Figs. 14 and 15.—Correction of open bite by Y-shaped excision in the horizontal ramus.

*The Splint.*—A splint similar to that described by Kazanjian (1939), was designed and constructed by Dr. Maynard E. Cohen. It consisted of bands cemented to anchor teeth to which an arch wire was connected. The arch wire contained lugs for intermaxillary ligation, as shown in Fig. 21. In the mandible it extended only to the tooth behind which the osteotomy was to be performed. A second detachable and adjustable appliance was prepared which has the purpose of drawing and holding the cut ends of the mandible in contact. The end of this appliance was made to fit into a square tube soldered to the molar band. This arrangement made it possible to place the extension wire bar in any of three positions, so that it could be placed over, under, or on the buccal side of the tube. The anterior threaded part was made to pass into a vertical loop soldered to the premolar band. This made it possible to lock the appliance by turning the two nuts on each side of the loop against each other when the artificial fracture had been properly reduced (Fig. 22).

*The Operation.*—Intravenous pentothal sodium anesthesia was administered by Dr. Lewis Dretler. Intravenous anesthesia eliminates vomiting, which is undesirable when intermaxillary ligation is employed. The patient had the usual preoperative medication with atropine, 1/100 grain. The pentothal was given in fractional doses by means of an intravenous drip, which maintains water bal-

ance. An endotracheal catheter was inserted through the nose so that the throat could be packed to prevent aspiration of blood and fluids during the operation. Some nitrous oxide and oxygen or plain oxygen was also administered at intervals during the operation through this tube.

Fig. 16. Fig. 17. Fig. 18.

Fig. 16.—Mouth of patient aged 18 years showing open bite deformity.
Figs. 17 and 18.—Lateral views of the patient with open bite which extends to the first molar region.

The intraoral procedure consisted of the extraction of the tooth on each side. A gingival flap was first prepared by making incisions at the anterior and posterior limit of the tooth socket on the buccal side, carrying them down over the alveolus in a divergent manner so that the pedicle of the flap was wider than the peripheral end (Fig. 23). The bone was thus exposed and a V-shaped section cut out on each side by means of burs and a chisel (Fig. 24). Care was exercised not to cut beyond the mandibular canal.

The extraoral procedure was done with a new sterile set-up, including instruments. An incision 5 to 6 cm. in length was made below the inferior border of the mandible, its outer surface being exposed without cutting the external maxillary artery. After carefully locating the apex of the V so as to connect with it, a vertical incision was made in the periosteum. The cortex of the bone was then perforated with a bur (Fig. 25), after which the chisel was used to complete the cut (Fig. 26). This required considerable force, since the cortex of the patient's jaw was unusually heavy, as seen in the x-ray films of the mandible. The bone, although cut from both sides, was not completely severed at this time, however; a little span was left, protecting the nerve and vessels of the jaw. After the vertical cut had been completed on the other side of the jaw in the same way, the chin was pressed upward with one hand to com-

Fig. 19. Fig. 20.

Figs. 19 and 20.—Roentgen examination of the jaws showing contact of the molars, caries in the left first molar underneath a filling, and a thick, heavy cortex of the jaw.

Fig. 21.—Splint designed by Dr. Maynard E. Cohen, similar to that described by Kazanjian (1939), inserted before the operation.

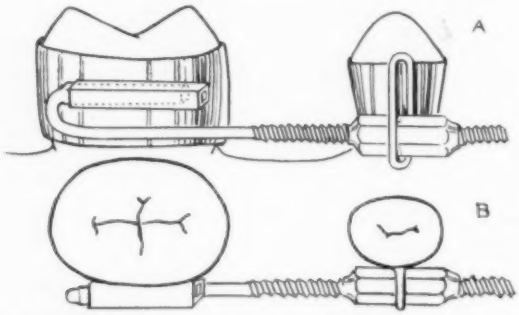


Fig. 22.—Accessory to the splint applied immediately after the operation to hold fragments in contact.

plete the artificial fracture. It was necessary to aid this procedure by inserting a chisel into the cut, first on one side and then on the other, in order to apply force on the anterior segment. The detached part was now very loose, and care had to be exercised so as not to displace it, for fear that the nerve and artery might be drawn out of the canal and later form a loop that might be caught between the fragments when brought together. While the chin was supported by the assistant, the skin incisions were closed with sutures. Rubber-dam drains were next inserted between the sutures on each side to prevent the formation of a hematoma (Fig. 27).

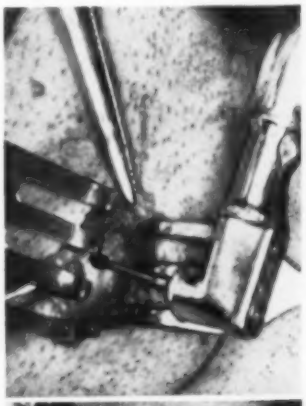

Fig. 23.

Fig. 24.

Fig. 25.

Fig. 23.—Gingival flap prepared on buccal side of the lower first molar.
Fig. 24.—After extraction of the first molar, a V-shaped section of bone was removed.
Fig. 25.—Incision at the lower border of the mandible and cutting drill holes through the lower part of the bone.

*Immobilization.*—The operation was continued in the mouth. First, the mucosa was sutured into place on each side with silk. Then the mandible was

placed so that the teeth attained the best occlusion possible. The detachable appliances were inserted and adjusted to bring the posterior fragments into good contact with the anterior one. Care was taken to bring the posterior mandibular molars into occlusion with the maxillary ones. The premolars had to be shaped by judicious grinding so as to occlude with their antagonists. This is necessary in most cases because teeth that have never occluded may not fit properly when brought together. The jaws were completely immobilized by intermaxillary ligation (Figs. 28 and 29). The intermaxillary wires were placed so that there was firm and strong fixation in the incisor region to counteract the pull from the geniohyoid and digastric muscles.

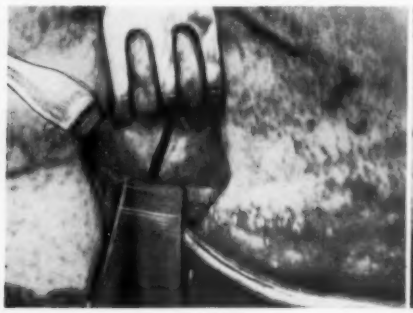

Fig. 26.

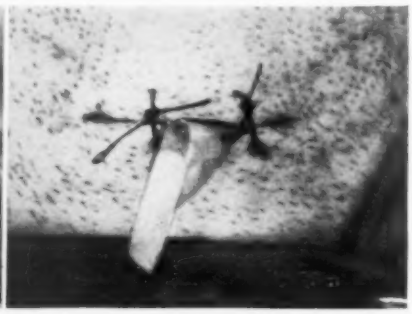

Fig. 27.

Fig. 26.—Vertical cut completed with bone chisel.
Fig. 27.—Incision closed with rubber-dam drain inserted.

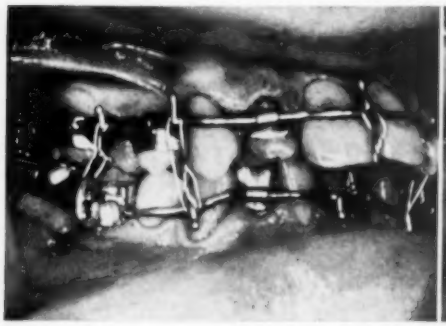

Fig. 28.

Fig. 29.

Figs. 28 and 29.—Anterior part of the mandible positioned and stabilized by the appliance.

*Postoperative care.*—There was only slight edema following the operation. Ice was applied to the jaw for the first twenty-four hours. In spite of all precautions, such as the use of the endotracheal tube, aspiration of accumulated mucus in the bronchi after the operation, and changing the patient's position in bed every half-hour while he was unconscious, he developed pneumonia on the second day. The temperature was 106.5° F., pulse rate 160, respirations 60, and x-ray examination showed evidence of lobar pneumonia. The white cell count was 12,400 with 86 per cent neutrophils, 5 per cent young neutrophils, and 9 per cent lymphocytes. Fluids were given intravenously and, at the recommendation of Dr. C. A. Janeway, 5 Gm. of sulfadiazine was administered promptly by the same method. An oxygen tent was installed, and the sulfa-

diazine was continued, two tablets being given by mouth every four hours. The sulfadiazine level in the blood was maintained between 10 and 12 mg. per 100 c.c. Dr. R. H. Overholt was asked to take charge of the pulmonary complications, and owing to his skillful treatment combined with careful nursing, the patient completely recovered. He was discharged one month after admission.

The drains were removed on the second postoperative day, and when the patient was able to take nourishment a liquid diet was prescribed, such as is given in ordinary fracture cases. The mouth was kept as clean as possible by means of a toothbrush and irrigation with a syringe after meals.

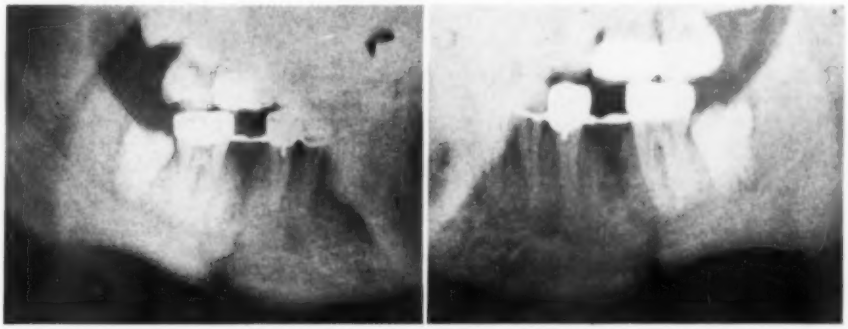

Fig. 30. Fig. 31.

Figs 30 and 31.—Roentgen examination 6 weeks after the operation at the time when the appliances were removed.

The skin sutures were removed on the fifth postoperative day and the intraoral ones 2 days later. The position of the jaw was checked by x-ray as soon as the patient's condition permitted. The findings were satisfactory and no further adjustments had to be made. However, a small sequestrum was located in the V-shaped opening at the right lower border of the mandible. A swelling appeared a few days later and a fistula opened in the incision. This was irrigated daily until two small pieces of bone were expelled, when the opening closed. The left side healed without complications.

The intermaxillary wires were removed after six weeks, when the mandibular splint alone was sufficient to hold the lower jaw together. Eight weeks after the operation x-ray pictures were taken again and disclosed satisfactory union. The V-shaped space at the lower border had begun to fill in with bone, as shown in Figs. 30 and 31. I therefore removed the attachments which were holding the fragments together, and when it was possible for the patient to eat without further discomfort the entire appliance was removed.

Examination five months after the operation showed satisfactory adjustment of the open bite (Figs. 32 and 33). It is interesting to note that the second molar had drifted forward, partly closing the space created by the extraction. It can be expected that in a patient 18 or 19 years old this space will in time close completely, making room for the third molar to erupt and improving the posterior occlusion. Another set of x-ray films taken at this time, showed complete healing (Figs. 34 and 35).

The end result was extremely satisfactory; the scars on the face were trivial, and after recovery the patient was accepted for the Air Corps.

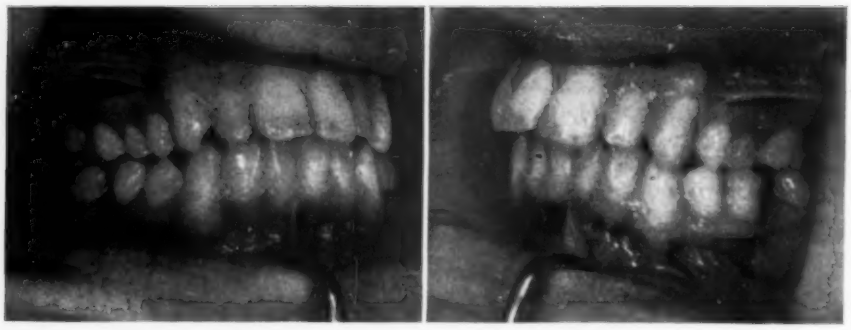

Fig. 32. Fig. 33.

Figs. 32 and 33.—Photographs taken five months after the operation showing correction of open bite.

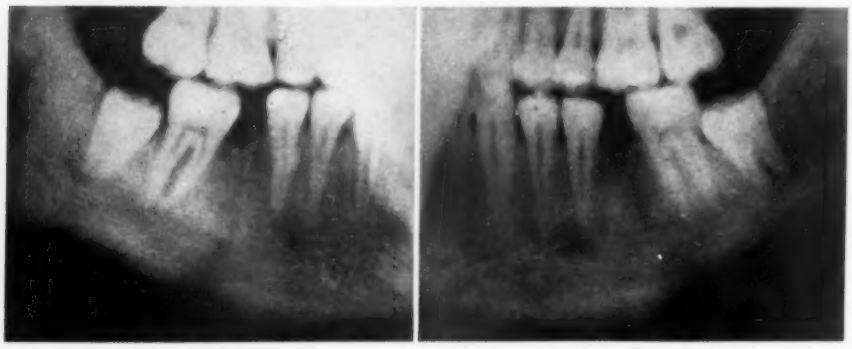

Fig. 34. Fig. 35.

Figs. 34 and 35.—Roentgen examination five months after operation showing complete filling in of the bone.

## SUMMARY

The various methods devised in the past for correction of open bite are reviewed.

Open bite with angulation in the occlusal plane, which may be due either to maldevelopment in the anterior part of the jaws, or to faulty reduction of a fracture in the horizontal ramus of the mandible, is best corrected within the dental arch.

A new method, termed the Y-shaped excision, for the surgical correction of open bite in adults with little or no mandibular protrusion is presented. The method is especially useful in cases with angulation of the mandible in the premolar or molar region.

The method is an improvement on the V-shaped excision. The operation is performed from both an intraoral and an extraoral approach, and therefore requires more time than the former procedure. This is justified, however, because it prevents injury to the alveolar nerve and vessels and gives a more accurate result.

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# REPORT OF THE HISTOPATHOLOGIC STUDY OF THE JAWS OF A DIET-DEFICIENT MONKEY, AND ITS RELATION TO VINCENT'S INFECTION

HENRY M. GOLDMAN, D.M.D.*

THIS is a report of the histopathology of the teeth and supporting structures of a young rhesus monkey that died after a six-month voyage from the tropics where he was captured. From the dietary history a diagnosis of avitaminoses was made. The histopathologic changes found in this animal are substantiated by the experimental data published by various investigators who have placed large groups of monkeys on deficient dietary regimes with a resultant Vincent's infection. The histopathology of these animals is identical with the changes seen in Vincent's infection, and is further evidence that Vincent's infection may be superimposed on a tissue, the vitality of which is impaired.

## INVESTIGATIVE WORK

The subject of deficiencies of certain essentials in the diet has been investigated by numerous workers, and the relation to oral lesions has been suggested as possible factors in the etiology of periodontal disease and Vincent's infection.

Boyle and his co-workers showed the relationship of ascorbic acid deficiency and dentine formation of the teeth and the periodontal structures. They kept animals on low levels of ascorbic acid administration for periods up to six months; these animals showed less than normal growth and a smaller increase in weight. The teeth were less firmly attached to the jaws that in normal animals, and the alveolar bone showed extensive resorption, especially on the labial alveolar wall. The fibroblastic cells of the periodontal membrane failed to form collagen fibers. By using alizarin to vitally stain the dentine during a particular period, the investigators were able to measure the difference in rate of deposition of dentine and the amount of ascorbic acid administered. They found that, after a standard depletion period, the amount of dentine deposited varied directly with the amount of ascorbic acid administered. Therefore, in ascorbic acid deficiency the rate of dentine deposition lags behind that of enamel, and the enamel-dentine relationship is reversed from normal.

Topping and Fraser reported an experiment on the effect of ascorbic acid deficiency in monkeys. Their monkeys developed a generalized necrotic gingivitis, the roots of the teeth becoming denuded. There was necrosis of the interdental papillae and marked accumulations could be seen around the teeth. The animals lived for an average of ninety-five days; the diet was completely deficient in ascorbic acid.

Chapman and Harris confirmed the findings of Topping and Frazer. They found that monkeys maintained on certain vitamin-deficient diets developed a

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tendency to oral lesions accompanied by an increase in the fusospirochetal flora. Monkeys maintained on an adequate stock diet do not exhibit this tendency. Limited observations by these workers indicated that monkeys maintained on diets deficient in the $B_2$ complex, except $B_6$, plus supplements of vitamins A, D, C, nicotinic acid, and riboflavin also tend to develop rather severe oral lesions, marked general symptomatology, and show short survival times.

Chapman and Harris also found that monkeys maintained on an adequate stock diet tend to resist artificial implantation of the fusospirochetal flora under the severest test conditions. The experiment consisted of collecting material from the necrotic gingivae and periodontal tissue of an infected individual with a blunt curette and scalpel, and transferring it directly to the traumatized tissue of a healthy animal. Necrotic material was even inserted into a tooth socket and no transmission resulted. The wounds healed in a normal fashion.

Fig. 1.—Photographs of the upper and lower jaws of the monkey.

An interesting experiment was performed by Wallace and his co-workers, who produced typical Vincent's infection in dogs, not by a deficiency, but by the injection of scillaren B. They gave daily injections of a 0.25 lethal dose of scillaren B, a squill glucoside, to a dog, and were able to produce the typical picture of Vincent's infection. The first manifestations occurred on the fourth or fifth day with redness and bleeding of the margins of the gingivae, and an associated discoloration of the teeth. The inflammation rapidly intensified and spread to the cheek and tongue. Death occurred on the fourteenth day if the drug was continued. Smears from the lesions of the mouth showed characteristic Vincent's organisms seen in humans.

It has been demonstrated that Vincent's organisms superimpose themselves on tissue with a lowered resistance. Cases with oral manifestations of blood diseases are often complicated by Vincent's infection. Tunicliff and his asso-

ciates point out that fusiform bacilli and spirilla are pathogenic when the vitality of the tissue is impaired. Thoma states that Vincent's infection is often superimposed on the devitalized tissue in pellagra. Krishnan has described changes seen in monkeys that were infected with *Leishmania donovani*. In these monkeys there occurred a gangrenous suppurative process allied to cancrum oris. This was associated with fusiform bacilli and spirochetes. Kirkpatrick has shown that in New Guinea a very common disease identical with Vincent's infection is associated with partial deficiencies of vitamins A and $B_2$.

Fig. 2.—Roentgenograms of the upper and lower jaws.

DESCRIPTION OF ANIMAL

The animal to be described was a small, young, rhesus monkey that died, seemingly from bronchopneumonia, after a six-month ocean trip to this country. He was one of a large group brought here for medical experimentation. The captain of the ship stated that he had had a considerable percentage of the

monkeys die. This particular monkey died the day the ship docked. The diet on board ship consisted of a coarse meal and water; no bananas or citrous fruits were fed to the animals.

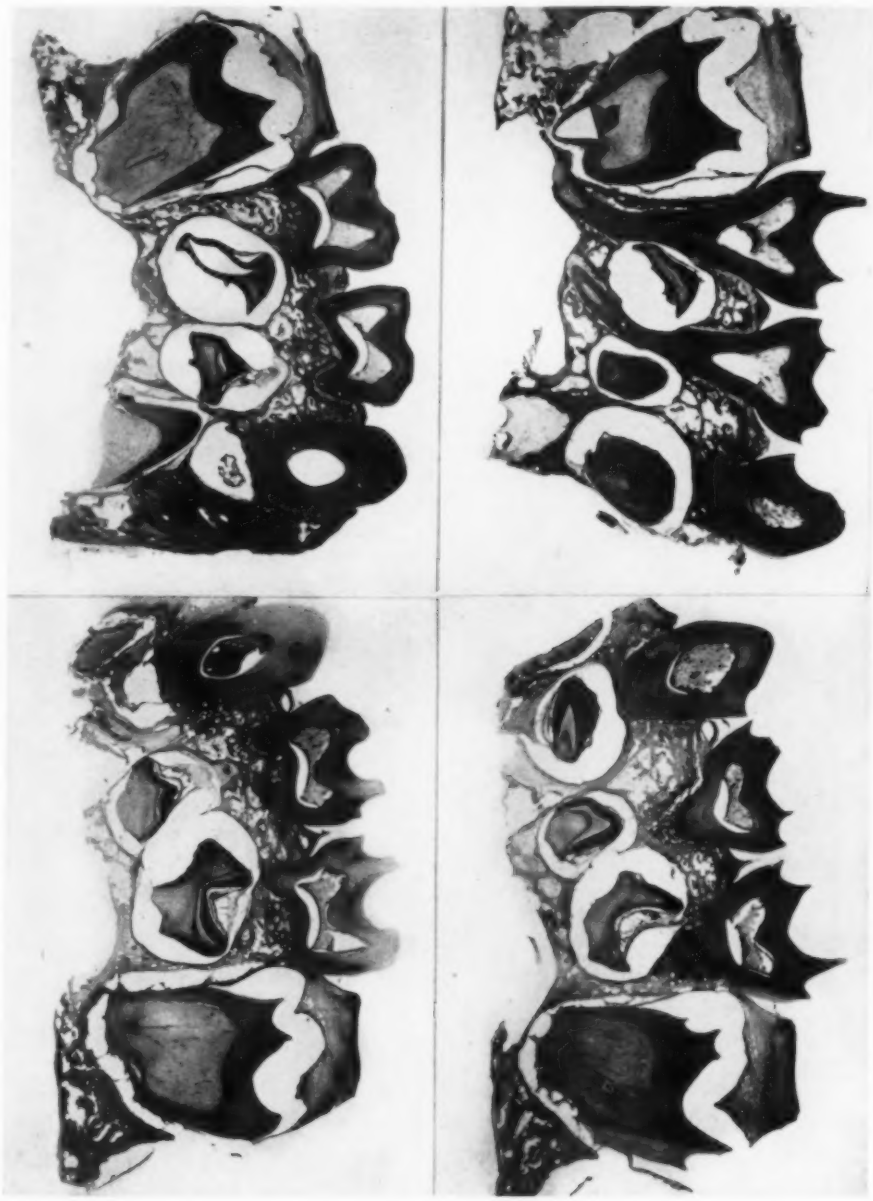

Fig. 3.—Low power photomicrograph of the right and left sides of the maxilla showing the deciduous teeth and the developing permanent teeth.

*Clinical Observations.*—The monkey appeared emaciated, due to the long deficient diet. The teeth showed marked attrition which was unusual in so young an animal, but was caused by the coarse meal in the diet. Fig. 1 shows photographs of the jaws. The gingivae are inflamed with necrosis of the interdental papillae, giving them a punched-out appearance. This is seen particularly well between the lower anterior teeth. Radiographs of the jaws (Fig. 2) show all the deciduous teeth and the first molars erupted. The lower second and third molars

can be seen developing; the remaining permanent teeth are also present in the jaws.

*Histopathology.*—Sections of the jaws of this animal showed altered tooth formation similar to that seen in ascorbic acid deficiency. Fig. 3 shows two sections each of the right and left sides of the maxilla. The deciduous teeth are in place, and the first molar has not yet broken through the gingiva. The tooth buds present show a greater amount of enamel formed in relation to the amount of dentine. Normally, the amount of dentine formed is greater than that of enamel, but ascorbic acid deficiency causes a retardation of dentine formation with the result that more enamel than dentine is laid down in the developing tooth. Another interesting fact is that the enamel has not dissolved from the section during decalcification of the specimen; also it has not separated from the dentine which indicates that is was not well calcified.

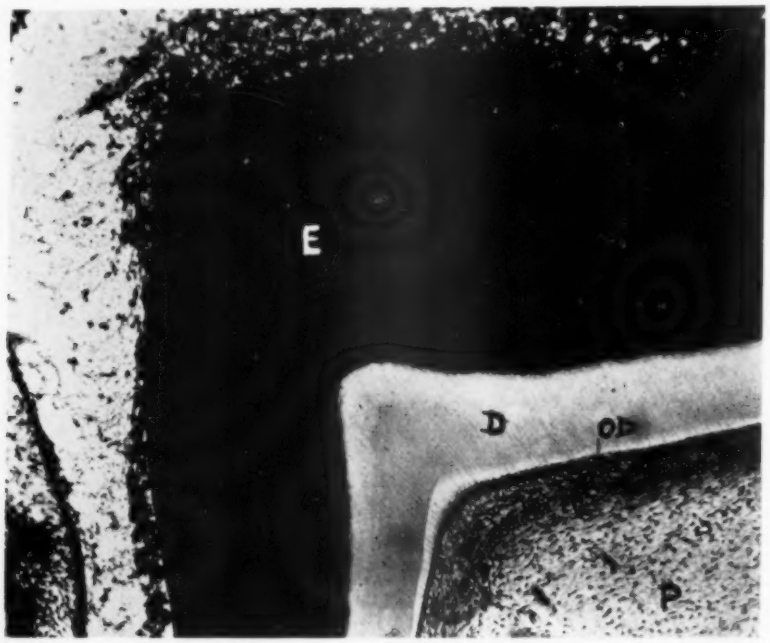


Fig. 4.—High-power photomicrograph of a developing permanent tooth showing the enamel and dentine formation. Note that the amount of enamel formed is greater than the dentine. *E*, enamel; *D*, dentine; *OD*, odontoblastic layer; *P*, pulp.

Further evidence of vitamin C deficiency is seen in Fig. 4, a high-power photomicrograph of a section through a permanent developing tooth. The formation of dentine has been greatly retarded with the result that the amount of enamel present is almost three times that of dentine. Marked changes are also seen in the odontoblastic layer.

Sections of the upper and lower incisor teeth are shown in Fig. 5. On the left are sections through the root canals of the deciduous teeth, and on the right, through the developing permanent teeth. There is marked attrition at the cutting edges of the erupted deciduous teeth, and flattening of the interdental papillae is evident with an accumulation of debris around the forming permanent ones.

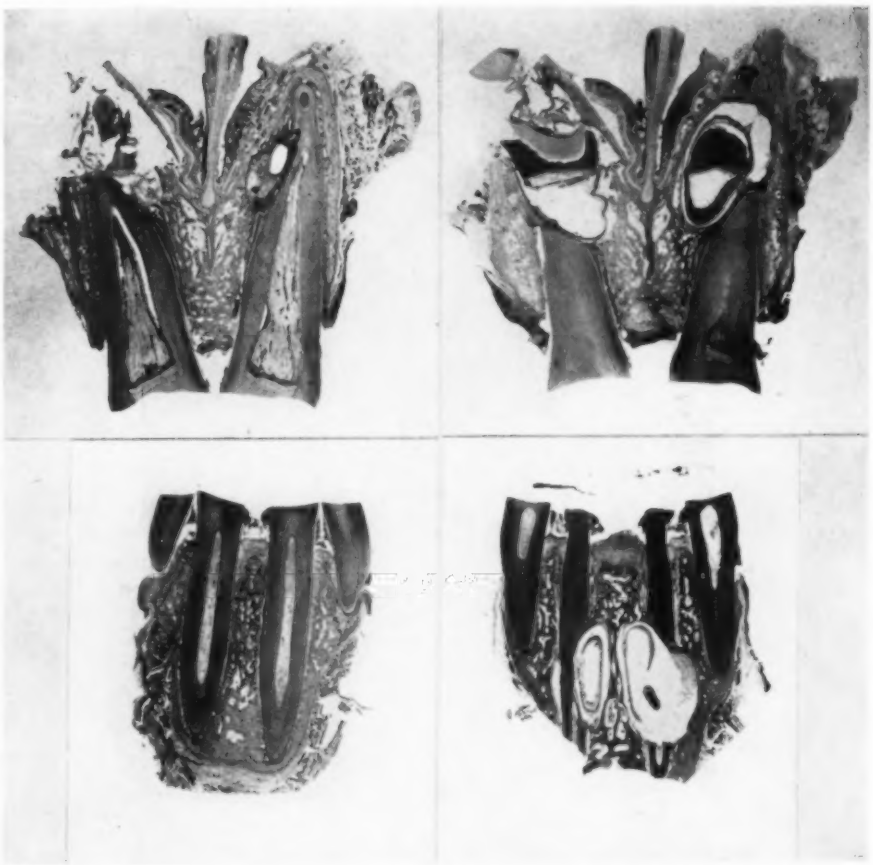

Fig. 5.—Low-power photomicrographs of the upper and lower incisor teeth.

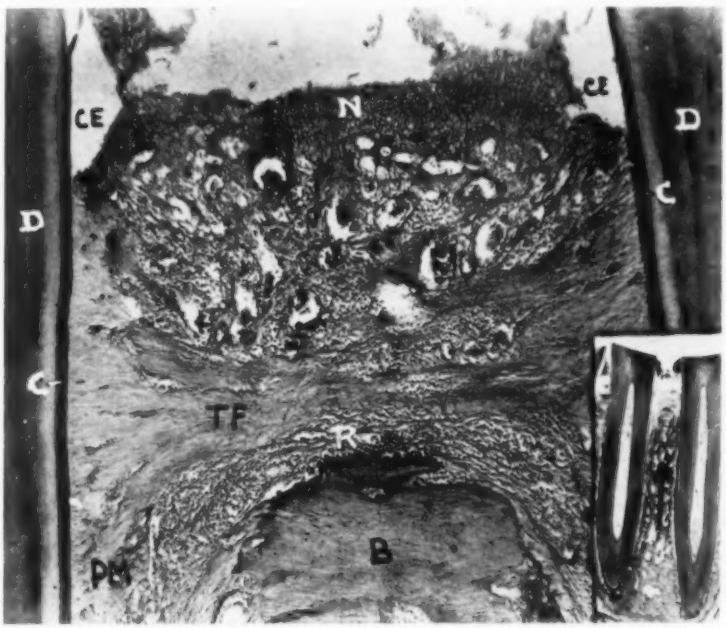


Fig. 6.—Photomicrograph of the interdental tissues between the lower central incisors, showing necrosis of the gingiva. A breakdown at the center of the transeptal fibers and resorption of the alveolar bone can be seen. *D*, dentine; *C*, cementum; *CE*, crevice; *N*, necrosis; *TF*, transeptal fibers; *PM*, periodontal membrane; *B*, bone; *R*, resorption.

The interdental tissues show necrosis of the gingivae with loss of the gingival and crevicular epithelium, as well as the epithelial attachment. These changes are seen in Fig. 6, a photomicrograph of the tissues between the lower central incisors. There is an abundance of blood vessels in the gingival corium. The

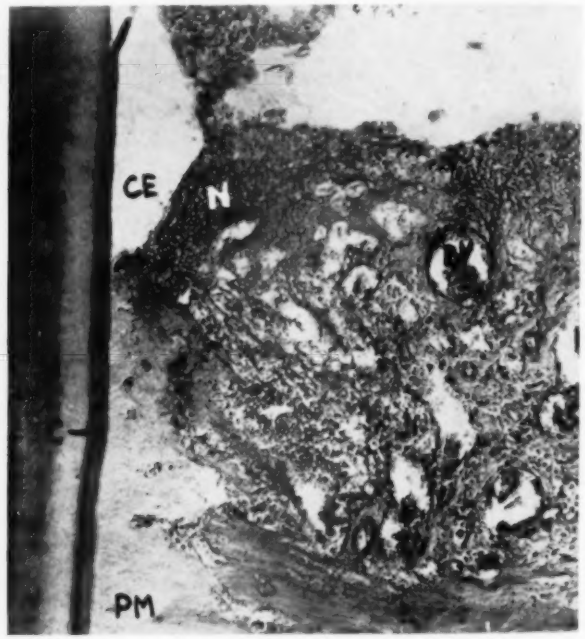


Fig. 7*A*.


Fig. 7*B*.

Figs. 7*A* and 7*B*.—High power photomicrographs of the gingivae in Fig. 6, showing necrosis and inflammatory infiltration, and the abundance of blood vessels. *D*, dentine; *C*, cementum; *PM*, peridontal membrane; *CE*, crevice; *N*, necrosis; *BV*, blood vessel.

transeptal fibers of the periodontal membrane are directly above the alveolar crest and are broken in the center. There is marked inflammatory infiltration which extends through the transeptal fibers to the alveolar crest and into the periodontal membrane. There is resorption of the alveolar crest.

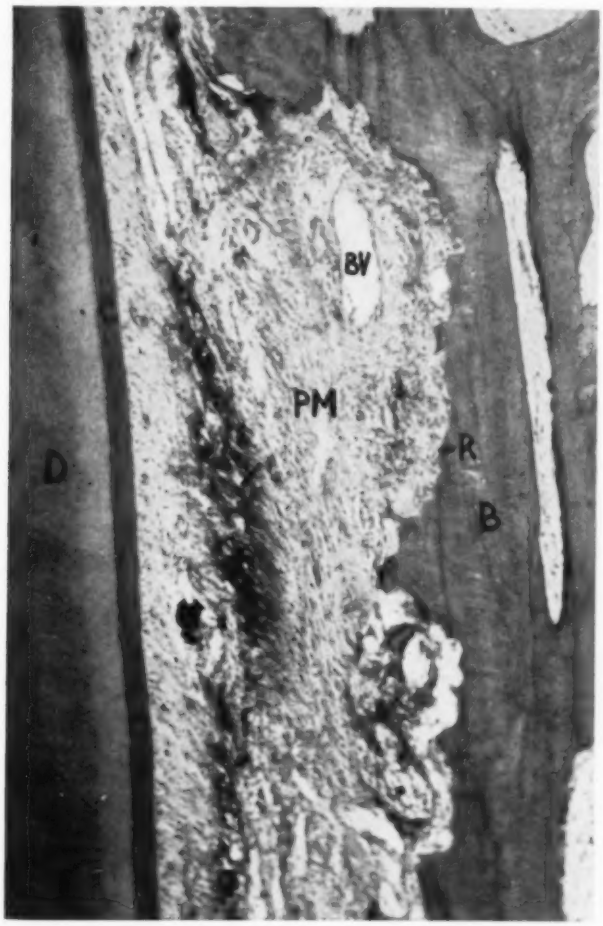


Fig. 8.—High-power photomicrograph of the periodontal membrane and adjacent alveolar bone, which is undergoing resorption. *D*, dentine; *C*, cementum; *PM*, periodontal membrane; *BV*, blood vessel; *B*, bone; *R*, resorption.

Figs. 7*A* and 7*B* are high-power photomicrographs of the gingival tissue seen in Fig. 6. There is marked cellular infiltration, and the tissue has become necrotic. The epithelium lining the papillae and the epithelial attachment of the gingiva to the teeth are destroyed due to the necrosis. There are many large blood vessels, which normally are not seen in this area, and may be clinically interpreted as causing bleeding. These changes seen in the gingivae are consistent with those found in Vincent's infection in humans.

The alveolar bone is undergoing active resorption; although few osteoclasts are seen, there are indentations on the surface of the bone which are Howship's lacunae (Fig. 8). There are capillaries along the margin of the bone. The characteristic formation of the periodontal membrane is disrupted, the collagen fibers running in an indifferent fashion. In many areas the principal fibers are ruptured. Many blood vessels are present.

SUMMARY

Study of the sections from the jaws of a monkey which lived on a deficient diet during a six-month voyage and died the day of arrival shows changes similar to those resulting from a dietary deficiency described by other investigators. Vincent's infection with necrosis of the papillae was demonstrated by clinical signs and verified histologically. A study of the developing teeth confirmed, furthermore, a diagnosis of ascorbic acid deficiency, the relationship of the enamel-dentine width being of diagnostic importance.

In man, the breakdown of the crevicular epithelium and the epithelial attachment in Vincent's infection histologically is the same as found in this monkey. From this we may conclude that Vincent's infection may not be a contagious disease but a manifestation of a dietary disease with the fusospirochetal flora superimposed.

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# SOME INTERESTING CASES

J. A. Ludwig, D.D.S., L.D.S., M.S.*

## CASE 1. A CASE OF ALVEOLOPLASTY AND RIDGE EXTENSION

DURING our routine examination of recruits, we came across the following very interesting case. The patient presented an abnormal tooth formation as outlined below.

*Upper Right.*—The central incisor was fractured, the lateral incisor and cuspid were present. The first bicuspid was rotated, the second bicuspid was missing. The first molar was present, the crown being a mass of enamel with no grooves or cusps. The second and third molars were present.

*Upper Left.*—The central incisor was normal; the lateral incisor was in lingual version. The cuspid and first bicuspid were normal. The second bicuspid was missing. The first, second, and third molars were present, the first and second being of abnormal formation.

*Lower Right.*—The central and lateral incisors, the cuspid and first bicuspid were normal. The second bicuspid was lingual to the second molar. The first, second, and third molars were present and of abnormal formation.

*Lower Left.*—The central and lateral incisors, and the cuspid and first bicuspid were present and normal. No second bicuspid was perceptible to visual examination. The first, second, and third molars were present and of abnormal formation.

The mouth was in poor hygienic condition. The soft tissues surrounding the molars were red and inflamed, exuding pus when pressure was applied. A pronounced overbite was present, and, due to the malformed and malposed teeth, the occlusion was very poor. (Figs. 1, 2, and 3.)

*Roentgen Examination.*—The following interesting points were observed in the x-rays shown in Fig. 4. The molars seemed to be compressed with little or no root bifurcation. The upper left first molar showed degeneration of its roots. An impacted tooth in this area was found, on removal, to be in the maxillary sinus. A radiolucent area involving the lower right central and lateral region was evident. According to the history, a blow to this area had caused a previous injury. The roots of the lower left first molar had been completely resorbed. Underlying this crown was a suppressed bicuspid.

We decided to remove all the teeth and perform an alveoloplasty and ridge extension operation to bring the mouth into a healthy condition.

*Surgical Procedure.*—As this case involved the removal of impacted teeth, the procedure was carried out in three separate operations. In the first operation, the posterior upper and lower right teeth were removed; in the second, the posterior upper and lower left teeth were removed. In the third operation,

*Captain, Dental Corps., U. S. Army.

the anterior teeth were removed and an alveolectomy and ridge extension performed as outlined by V. H. Kazanjian.*

Following the induction of anesthesia, an incision was made along the prominent alveolar margin down to the bone. The tissues were elevated, both labially and lingually, well up to the anterior nasal spine and canine fossa.

Fig. 1.

Fig. 2.

Fig. 3.

After the tissues were extensively undermined, the bone was removed by chisels and rongeurs. A section of the anterior nasal spine was removed also, to allow for a higher labial attachment. All sharp edges were filed and the area carefully cleaned of bony spicules. The margins of the incisions were approximated and the wound closed by interrupted sutures. The removal of bone allowed

*Blair, V. P., and Ivy, R. H.: Essentials of Oral Surgery, ed. 2, St. Louis, 1936, The C. V. Mosby Co., Chap. XIII.

the labial flap to slide to a higher position, which was maintained by a small flexible rubber tube placed well up under the lip. Interrupted mattress sutures were passed around it and through the lip on to the face (Fig. 5). These were placed in such a way as to create upward tension on the mucous membrane surfaces. They were tied over gauze to prevent cutting the skin (Fig. 6). A dressing was placed over the lip and strapped in place with adhesive tape. The tape was split and one-half placed over the nose for support. A wide elastic band was placed under tension with adhesive tape over the lip to control edema (Fig. 7). The band was removed in two days, and the sutures in six days.

Fig. 8 shows the upper jaw healed, and the high alveolar ridge obtained by the surgical procedure. Fig. 9 shows the dentures in place, and Fig. 10 the profile of the patient.

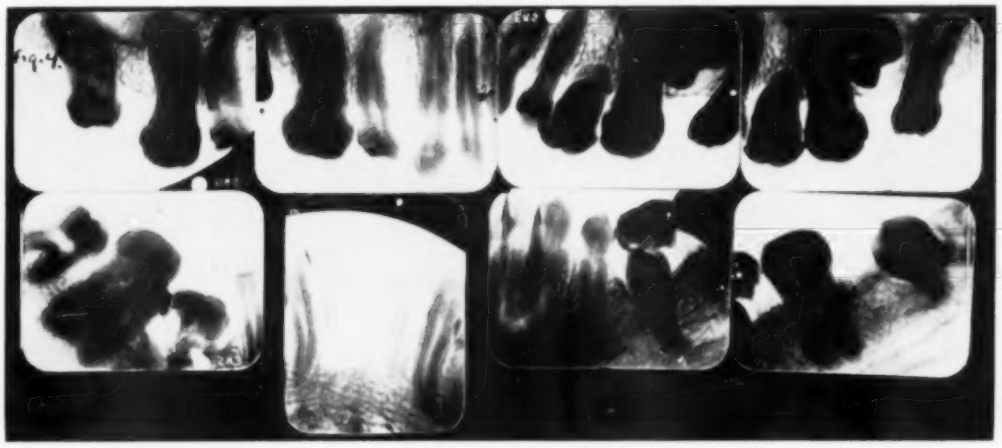


Fig. 4.

CASE 2. A CASE OF DOUBLE LIP

An officer presented himself at the clinic with double formation of the upper lip (Fig. 11).

*History.*—Fifteen years previous to examination, the patient had been kicked by a horse, and since then, as well as he remembered, this peculiar formation (shown in Fig. 11) had gradually developed. It had not increased in size recently, but had remained static, he thought, for the last eight years. He found it somewhat annoying, both for esthetic reasons and the fact that he kept biting it with his lower teeth.

*Surgical Procedure.*—The area was infiltrated with a 2 per cent solution of novocain. A horizontal, wedge-shaped section about 6 mm. was removed from both sides of the inner surface of the lip and a vertical wedge was resected from the central portion. The borders of the resulting wound were undermined for a distance of 1½ cm., and the hypertrophied submucous tissue was excised. Care was taken to preserve the circulation and symmetry around the corners of the mouth. The wounds were closed with interrupted sutures of fine, silk-worm gut (Fig. 12). Each suture incorporated a few fibers of the orbicularis oris muscle. Fig. 13 shows the appearance of the area following the operation.

*Biopsy Report.*—The specimen consisted of a large number of small lobules of grayish tissue which, on microscopic examination, were composed of a number of small mucous glands arranged in lobular fashion. The cells of the glands were tall and columnar in type.

*Diagnosis.*—Hypertrophied labial glands and submucous tissue.

Fig. 5.

Fig. 6.

Fig. 7.

CASE 3. A SECOND CASE OF DOUBLE LIP

A case similar to Case 2, with double lip formation not so pronounced, is shown in Figs. 14 and 15. The lip was operated upon by the same procedure described above. It healed uneventfully. The final result is shown in Fig. 16.

Fig. 8.

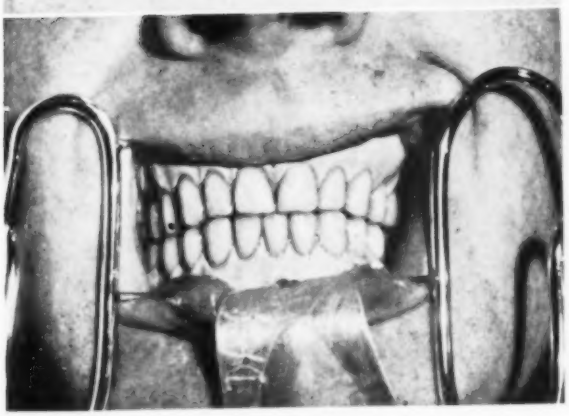


Fig. 9.

Fig. 10.

CASE 4. SIMPLE RETENTION CYST OF LOWER LIP

A patient presented himself complaining of an enlarging area felt in the lower lip. It was associated with tenderness in that region.

*Gross Examination.*—A cystic formation was palpated in the lower lip which was movable upon manipulation. It caused a swelling at the transitional part of the lip (Figs. 17 and 18).

Fig. 11.

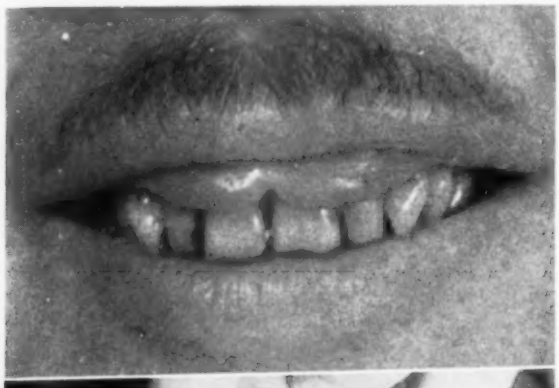
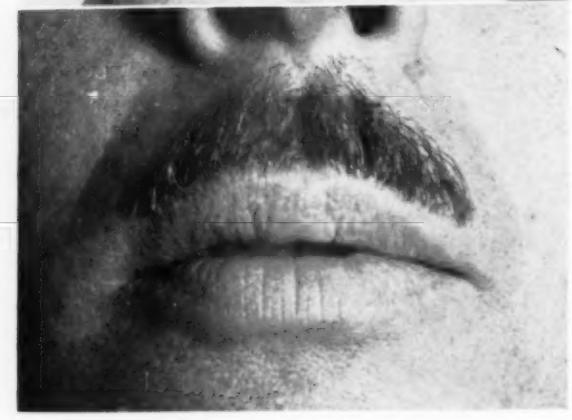


Fig. 12.

Fig. 13.



*Surgical Procedure.*—The lip was infiltrated with a 2 per cent solution of novocain. A vertical incision was made, and the cyst carefully dissected out to be removed in toto. The wound healed uneventfully.

*Biopsy Report.*—The specimen measured 13 mm. by 10 mm. by 7 mm. and included a cyst which measured 7 mm. in diameter. The cyst contained a whitish material.

Microscopic examination showed a cyst wall which was composed of fibrous tissue and lined with an irregular layer of cuboidal epithelial cells. The wall was infiltrated by lymphocytes and the cyst contents were composed of amorphous material which was infiltrated by neutrophiles, histiocytes, and lymphocytes.

*Diagnosis.*—Simple retention cyst with secondary infection.

Fig. 14.

Fig. 15.

Fig. 16.

CASE 5. MIXED TUMOR OF PALATE

*History.*—Patient complained of pain, swelling, and tenderness of palatal area, and difficulty in swallowing.

*Visual examination* showed a mass on the right palatal surface, extending to the soft palate. The mass was movable and painful and is shown in Fig. 19. Its removal was advised.

*Surgical Procedure.*—Under block anesthesia with a solution of 2 per cent novocain, a vertical incision was made. The mass was carefully dissected and removed in toto. The area was cauterized and sutured. Healing was uneventful.

*Biopsy Report.*—Gross examination showed the specimen to consist of a lobulated tumor measuring 2 by 1.7 by 1 cm. On section, it was observed to be a firm, translucent, grayish-yellow tissue.

Histologically, the tumor was composed of small, deeply staining, spindle-type cells, resembling those of basal epithelium. In certain places, these cells formed pseudo rosettes, and in others they had a true adenomatous character, and fine gland spaces, many of which contained an eosinophilic substance. These cells were separated by a dense fibrous tissue showing hyaline change in some areas and in others a very early myxomatous change. The appearance was that of an adenoma arising from misplaced salivary gland tissue.

*Diagnosis.*—Mixed tumor of palate.

Fig. 17.

Fig. 18.

CASE 6. CYLINDROMA OF PALATE

During routine examinations, the following case was discovered.

*History.*—The patient had noted a fullness in his mouth for years. This had been of such long duration that he was under the impression it was a normal condition. There was no pain or discomfort in evidence.

*Gross Examination.*—A growth of considerable size extending well over the complete palatal portion and partially over the left alveolar ridge was found (Fig. 20). It was palpable and somewhat moveable; there was no pain.

*Surgical Procedure.*—Under block and infiltration anesthesia with a 2 per cent solution of novocain, a cross incision was made. The flaps were undermined and the tumor carefully dissected. The tumor was encapsulated and removed in toto. The area was cauterized, excess palatal tissue was removed, and the flaps approximated and sutured.

Fig. 19.

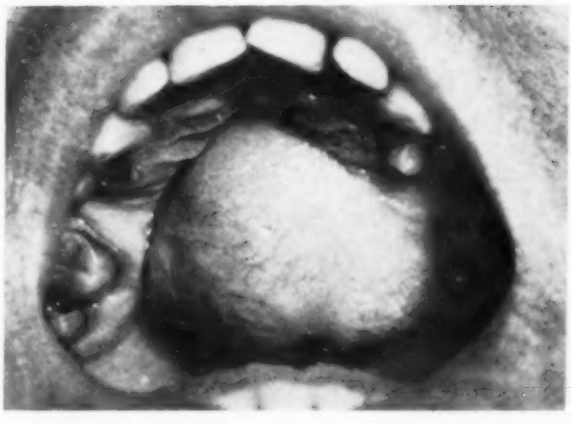


Fig. 20.

Two days following the operation the healing seemed to be uneventful. Because the surgeon was transferred, he was unable to follow the case. However, a biopsy report was obtained. The tumor was described as a lobulated mass measuring 5 by 3 by 2 cm. and the diagnosis was cylindroma.

# THE TUBERCULOUS DENTAL PERIAPICAL GRANULOMA

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NEW YORK, N. Y.

IN THE early part of 1936, an investigation was begun at Sea View Hospital, in New York City, to study the periapical granuloma in patients afflicted with tuberculosis. It was felt that some of these blind abscesses might be specific tuberculous lesions.

In general, we can conceive of three routes whereby the tubercle bacillus can gain entrance and become implanted in the periapical tissues. The first is the invasion of the dental pulp through a deep carious lesion by the acid-fast bacilli in the saliva (Figs. 1 and 2). Should the pulp degenerate and break down, a tuberculous periapical infection might result. A second route, and one always to be considered in patients with advanced pulmonary tuberculosis, is the hematogenous one. And third, deep periodontal pockets could likewise be the source of entry for the organism, which might find its way to the periapical tissues (Fig. 3). It is also conceivable that some patients with deep subgingival involvements which do not respond to the usual periodontal treatments may be harboring tuberculous infection of the paradental tissues even though its presence is not evident.

In our study, the patients, all of whom had some form of tuberculosis, received routine intraoral roentgenographic examinations, by means of which the diagnosis of periapical granuloma was established. The involved tooth was then removed, often with the granuloma adherent. Otherwise, the periapical mass was gently removed from the socket with suitable curettes. The specimen was then placed in 10 per cent formalin, and sent to the pathologist for sectioning and study.

The cases were selected at random, and data were collected which might aid in drawing conclusions as to the mode of inoculation of the granuloma. This included recording of the Gaffky counts of the sputum;‡ dental caries in contact with the pulp; deep-seated periodontal pockets; and evidence of hematogenous spread of the disease, systemically.

Of the 362 specimens sent for study, 30, or 8 per cent, were reported as having definite tuberculous pathology (Fig. 2). All the others were reported as chronically inflamed, nonspecific granulation tissue. The importance of these findings is definite. They indicate that a patient may harbor a tuberculous focus without manifesting any signs or symptoms. Such a lesion can be detected only by means of a dental radiographic examination.

Almost all of the patients studied had positive Gaffky sputum counts at one time or another, thus making possible infection by the pulpal or periodontal

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‡A negative Gaffky indicates the absence of tubercle bacilli in the sputum, whereas a Gaffky count between V and X would indicate a sputum containing many of the organisms.

Fig. 1.—Typical periapical granuloma (tuberculous) resulting from carious exposure of the pulp.

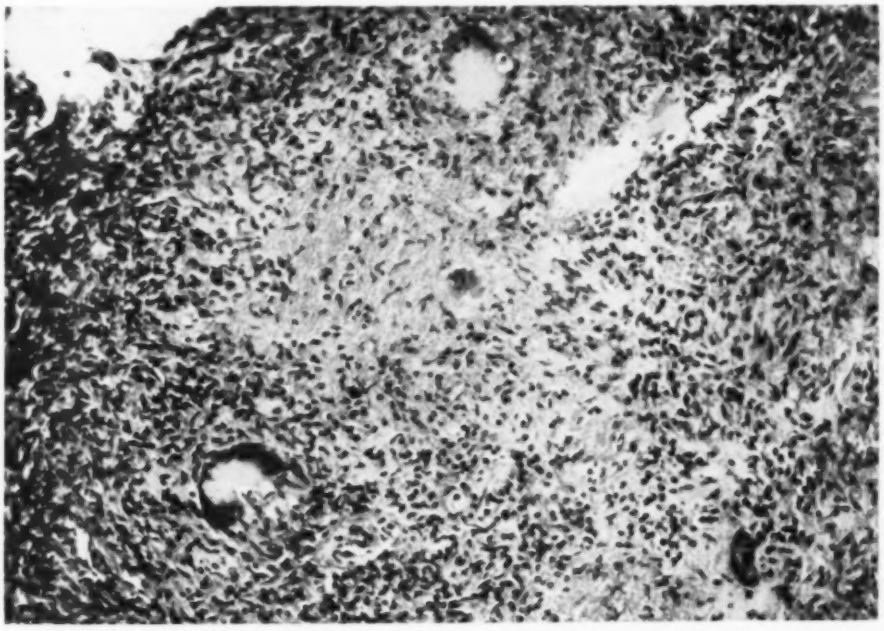

Fig. 2.—Typical photomicrograph of tuberculous tissue obtained from the periapical granuloma depicted in Fig. 1.

Fig. 3.—A tuberculous periapical granuloma resulting from a subgingival involvement of the third molar.

routes. Only four of the thirty positive patients manifested evidence, either clinically or postmortem, of a definite hematogenous spread systemically. Seventeen showed no evidence of hematogenous spread. The remaining nine had

Fig. 4*A*.—Tuberculous periapical involvement of several teeth.

Fig. 4*B*.—Postoperative radiograph showing the osteolytic areas which perforated the mucous membrane.

Fig. 4*C*.—A painful tuberculous ulcer with a bone cavity resulting, primarily, from the tuberculous periapical granuloma.

tuberculosis of the larynx or gastrointestinal tract, which may have been hematogenous in origin, or may have resulted from the swallowing of heavily infected sputum.

Fig. 5*A*.—Tuberculous periapical granuloma of the first molar with a bony excavation which had broken through the mucous membrane.

Fig. 5*B*.—Photograph depicting the bony excavation and the mucous membrane involvement.

COMMENT

We have found that approximately 8 per cent of the patients studied (patients who are in a tuberculosis hospital receiving the routine treatments) manifested positive tuberculous granulomata at the apices of teeth. These cases were selected at random. If patients with healed or arrested pulmonary and other systemic tuberculous processes are permitted to leave the hospital without dental radiographic study, they may harbor these residual tuberculous infections at the root apices. One can conceive of the possibility of these foci flaring up at a subsequent time when the patient may be below par or fatigued.

Certainly, in the case of root canal therapy in a tooth involved with a periapical tuberculous granuloma, the chances of obtaining a good result without resorting to periapical surgery are not very great. If, however, it is important that the tooth be retained, root amputation with careful periapical curettage and sealing of the root canal can be performed with reasonably good results.

It is interesting to observe the relative infrequency of bony tuberculosis of the maxilla and mandible and tuberculosis of the traumatized soft tissues following dental extractions, even though we find the tubercle bacilli literally bathing the exposed socket (Figs. 4*A*, 4*B*, 4*C*, 5*A*, and 5*B*). In a series of our last several thousand patients receiving all forms of oral surgery, and many having high Gaffky counts, there were only three who developed tuberculous bone involvements in the wounds open to the mouth. This tends to substantiate the theory that the endogenous factors are all important in tuberculosis.

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# PREGNANCY AND THE TEETH

JESSE H. COVEN, A.B., B.S., D.D.S., BROOKLYN, N. Y.

THE literature on the subject of caries relative to pregnancy is quite controversial. The dental pathologist believes that the prevalence of caries is related to the age group into which the average pregnant woman falls. Kronfeld[1] writes the following:

> Calcium from the skeleton can be mobilized either by osteolytic or osteoclastic activity. No such mobilization of calcium from the teeth has ever been shown. There is no conclusive statistical evidence that the incidence of caries during pregnancy is greater than that in non-pregnant women of corresponding age.

The dental clinician (Greenstone[2]), on the other hand, makes the following statement:

> In the mouth, first and foremost, we note a marked increase in the number of cavities and the rapidity with which caries develops. The damage done to the dental apparatus during pregnancy is appalling; in fact, at no other time in the history of the individual, except possibly in childhood, do we see such general and widespread susceptibility to decay.

The two factors influencing the loss of teeth or of tooth structure are heredity and environment. Hereditary influences do not play a major role in the dental defects of pregnancy because we assume that such defects as incomplete coalescence of the various lobes of the teeth or incomplete calcification of tooth structure have been taken care of prior to the time that pregnancy occurs. It is also obvious that the hereditary background does not change just because a woman becomes pregnant.

Environmental factors, therefore, play a major role in dental aberrations due to pregnancy. These environmental factors can be considered in two major headings: systemic and local.

Let us first consider how systemic factors may play a part in the loss of teeth and tooth structure during pregnancy. Since there is no blood supply to the enamel, we can rule out this factor in caries formation. However, the blood stream is altered because of the necessity for the nutrition of the fetus, and also because of changes in the endocrine system.

According to Schour,[3] the total calcium need of the fetus is less than 1 per cent of the mother's storehouse, and such a drain is not serious. He advises, however, that for the general health of both mother and infant, the daily calcium intake during pregnancy be increased to 1.5 Gm. per day.

Increase in the production of parathyroid hormone associated with the hyperparathyroidism of pregnancy may have a definite bearing on some of the

oral phenomena observed during this period. Cahn[4] states that increased productivity of the parathyroid may result in loosening of the teeth and is associated with the presence of the giant cell tumor, both of which, coincidentally or not, are frequently observed during pregnancy. The activity of the parathyroid gland also controls the blood calcium and tissue calcium balance regardless of calcium intake.

Let us now consider how changes in the local environment may influence the incidence of caries. These environmental factors are food, soft tissues, and saliva.

A woman who, prior to pregnancy, was a staunch adherent to the lamb chop and toast school of diet may suddenly decide to "let herself go," and indulge in all those foods which, previous to finding herself in this interesting condition, would play havoc with her figure. This sudden reversion to soft, sticky foods may result in lack of physiologic stimulation or thorough cleansing of the teeth, with the formation of carbohyrate deposits and plaques on the surfaces thereof.

The so-called gingivitis of pregnancy may result in an increase in the incidence of caries. The retention of food particles between tooth and hypertrophic gingival crest and the resulting fermentation of this food material is certainly a contributing factor in the advance of the carious process.

Alterations in the chemistry of the saliva play an extremely important role in contributing to the carious condition during pregnancy. It has been observed that[3] those women who, during the first trimester of pregnancy, reported disturbances of nausea and vomiting, also exhibited greatest incidence of caries. The fluid regurgitated from the stomach is highly acid. The prolonged contact of this acid with tooth structure results in the dissolution of the enamel. This etching of the enamel may not manifest itself as a carious spot until the postpartum period.

It is believed by some writers[3, 5] that caries of pregnancy is, in reality, caries of fear, superstition, and neglect on the part of both patient and dentist. Many dentists through lack of understanding of the psychology and physiology of a natural condition limit their services to purely palliative measures. By such practices the opportunity to serve and educate a most receptive patient is lost.

I have performed necessary extractions on patients whose pregnancy was of eight months' duration, the removal of a partially impacted lower third molar during the third month, and multiple extractions under nitrous oxide-oxygen anesthesia for a patient who was six months' pregnant, all with no untoward effect.

Incidentally, nitrous oxide anesthesia is not contraindicated if care is taken to minimize the excitement stage. Local anesthesia may be used freely if the concentration of vasoconstrictor is not too great. Pain may do more damage, both mentally and physically, at this time than anything we might do in the normal course of treatment. Avoidance of pain results in a greatful convert to the ministrations of the dentist at all times, but this is doubly true during pregnancy.

## CONCLUSIONS

1. The chemical nature of the diet during pregnancy plays no role in the etiology of caries, while the physical quality may have some effect.

2. Tooth loss through periodontal lesions is probably a result of an altered endocrine balance.

3. Acid saliva caused by regurgitated material is probably the cause of most cases of pregnancy caries as well as caries during immediate post-partum period.

4. Fear, superstition, and neglect on the part of both patient and dentist is probably the major cause of dental disease during pregnancy.

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156 St. Paul's Place

# Case Report

## CASE NO. 85

## RECURRENT CYST OF MANDIBLE

A. C. Hitzelberger, D.D.S., Utica, New York

The patient, a male, came to my office in November, 1938, complaining of a sore tooth.

*Roentgen examination* showed a cyst extending from the third molar region up into the ascending ramus (Fig. 1) of the mandible.

Fig. 1.

*Operation.*—Under general anesthesia at the hospital, the teeth and cyst were removed and the areas drained. The wound healed uneventfully.

A specimen was sent to Buffalo and the following report received: "Section of tissue from jaw shows a cyst lined by squamous epithelium with inflammatory reaction in the surrounding connective tissue."

The patient was not seen again until April, 1943, when he again presented himself with a swelling in the same area.

*Roentgen Examination.*—The x-ray showed a recurrence above the region of the previous cyst. It was very extensive, reaching nearly to the sigmoid notch (Fig. 2).

Fig. 2.

*Operation.*—When the area was reopened, the outer wall of the ramus was found to be completely denuded, and the inner wall quite thinned out. There was a cyst membrane in the region of the third molar. The upper third of the ramus had apparently been destroyed by the infection. The cavity was filled with sulfathiazole paste, and later packed with gauze soaked in bone wax.

*Microscopic Examination* (Laboratory of Oral Pathology, Harvard University).—The specimen consisted of what appeared to be a piece of gingiva, and a larger piece of tissue which was taken to be the cyst sac removed in the above operation.

Microscopic examination of the gingival tissue showed it to be covered by stratified squamous epithelium which showed evidence of acanthosis and hyperkeratosis. In the submucosa, which consisted of fine interlaced bundles of collagen fibers, there were seen various mucous or sebaceous glands such as are found in Fordyce's disease (Fig. 3). Also, at the periphery there was

noted a few striated muscle fibers. The tissue was not very vascular and showed some evidence of inflammatory infiltration.

Examination of the cyst showed a cyst membrane which was folded and wrinkled. Throughout, there was a well-defined epithelial layer consisting of

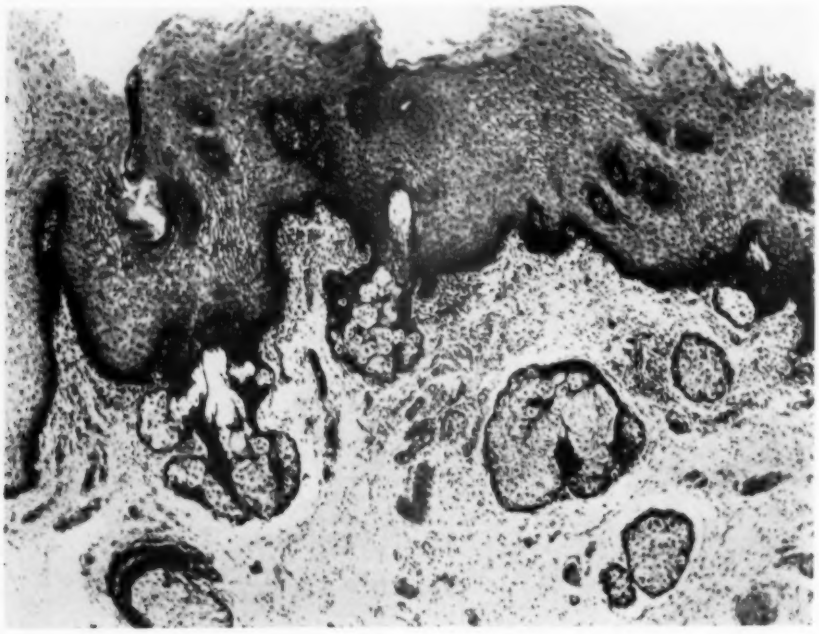

Fig. 3.

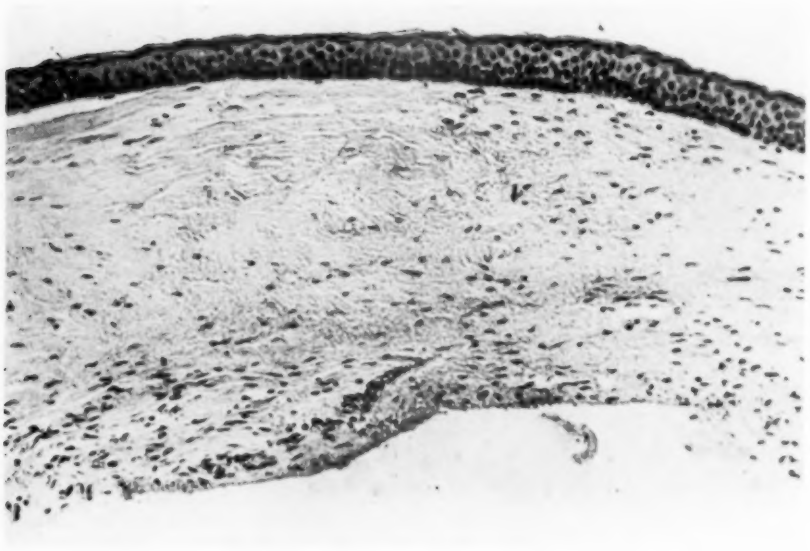

Fig. 4.

four to five layers of stratified squamous epithelium without rete pegs (Fig. 4). There was no evidence of any epithelial proliferation from the surface or from the basal membrane into the underlying corium. The connective tissue part

of the membrane was made up of collagen fiber bundles and fibroblasts, and there was evidence of considerable round-cell infiltration. In some areas there was hemorrhage into the tissue which was probably caused by the operative procedure.

*Diagnosis.*—Cyst with chronic inflammation.

14 Hopper Street

# Editorial

## Cancer Control

In an editorial in the *Journal of the American Medical Association** called "Postwar Planning for Cancer Control," the following recommendations are made for more effective control of the disease in years to come: first, unremitting promotion of research on cancer; second, better education about cancer; and third, more facilities for diagnosis and treatment of cancer.

While the only hope of solving the fundamental problems of cancer lies in research, the editorial points out, this does not meet the immediate needs of the cancer patient. Although it is recognized that the best results are obtained from treatment given as early as possible, cancer cannot be treated earlier than when the patient comes to his physician of his own free will, and this is often late. Lack of early action by the patient is not, however, the only difficulty in control of cancer. There is also the factor of lack of competent treatment. This may be based on the inability of many general practitioners to recognize cancer, especially when diagnosis involves highly specialized examinations, such as are necessary for detecting cancer of the uterus or of the gastrointestinal tract. The editorial goes on to suggest the organization of facilities for periodic health surveys, and the encouragement of group examination to provide better opportunity for prevention and early diagnosis and treatment of cancer.

The dentist has an unusual opportunity to render such a service within his field to his patients, since the dental profession has already trained the public to periodic examinations of the teeth. The importance of a careful examination of the entire oral cavity, and of the jaws by means of x-ray films, should, however, be constantly stressed. The general dentist may not be able to recognize cancer or to distinguish it from inflammatory and benign lesions in every case, but he should recognize suspicious conditions, and though the lesion may be small and of short duration, he should place his patient in competent hands for biopsy and proper treatment. In clinics and in private practice the oral surgeon constantly sees patients who had teeth extracted because of gingival swelling or bleeding, or who had prolonged treatment of ulcers and hypertrophies which did not get well. Thus valuable time is often lost until such patients become dissatisfied and finally come into competent hands.

Besides the diagnostic problem, the oral surgeon has an important part to play in the matter of education. All too frequently, in clinic work especially, a patient found to have low-grade cancer, and given an appointment for surgical or radiological treatment, fails to keep his appointment and does not appear for

*J. A. M. A. 122: 951, 1943.

weeks or even months. This neglect on the part of the patient may be due to fear of treatment, to the economic problem of work stoppage, or simply to carelessness. In any event, the patient who does not keep an appointment for treatment of cancer obviously does not understand the gravity of the disease. The dentist should make clear to each patient the danger of a delay of even a few weeks in the treatment of cancer; otherwise, the advantage of early diagnosis may be lost through ignorance. To dispel such ignorance where it exists is as much a responsibility of the doctor as is the proper treatment of disease.

*K. H. T.*

# Abstracts and Reviews

**Wound Healing and Infection After Local Implantation of Sulfonamide Powder:** By J. Albert Key, J. A. M. A. **122**: 1003, 1943.

A study of 600 consecutive cases in which sulfonamide powder was planted in operative wounds. This series included only clean operations in the field of orthopedic surgery and not cases of infection, contaminated wounds, or compound fractures. In clean wounds a mixture of two parts of sulfanilamide and one part sulfathiazole was used. Since these drugs are not bactericidal, sterile packages containing 5 Gm. each of sulfanilamide or sulfathiazole or a mixture of the two can be obtained from drug houses. Or the drugs can be sterilized in glass tubes or bottles by autoclaving at 18 pounds pressure for twenty minutes. This method does not kill spores. The author concludes that the incidence of operative infection in over 600 cases was possibly lowered. Wounds healed in a normal manner without excessive scar formation. The average period of hospitalization was shortened by the use of the drugs. However, an excessive amount of the drug may delay the healing of the wound.

*D. W.*

# Announcement

## New York University College of Dentistry Postgraduate Course

New York University College of Dentistry announces postgraduate course in Inhalation Anesthesia, with special emphasis on Nitrous Oxide-Oxygen Anesthesia conducted by Dr. E. A. Rovenstine, Professor of Anesthesia, N. Y. U. College of Medicine and Bellevue Hospital, and Dr. A. S. Mecca, Assistant Professor of Oral Surgery, N. Y. U. College of Dentistry and Bellevue Hospital.

The course will consist of lectures and practical demonstrations conducted in six successive three-hour morning sessions. It will deal with the theory and practice of general anesthesia in ambulatory cases, and patients cared for in private practice. To give the student a sound foundation and background, the subject will consist of a discussion of the mechanics of anesthesia and the principles and technique of administration. Special attention will be given to the examination of the patient, proper steps in positioning, also the principles of administration. With respect to the technique of administration, the cardinal points in symptomatology, complications and emergencies will be stressed. A detailed study will be made of postoperative observation of patients, bearing directly on psychologic principles and rest.

The course will be given on Friday mornings beginning Oct. 22, 1943, and ending Nov. 26, 1943. Classes will begin at 9 A.M. and continue to 12 o'clock noon.

Direct all communications to the Office of the Dean, N. Y. U. Dental College, 209 East 23rd Street, New York City, N. Y.